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Seasonal variation in food and feeding habit of Indian major carp (*Labeo rohita* Ham.1822) in Vallabhsagar reservoir, Gujarat

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Abstract: The gut content analysis provides the information on food components and feeding habit of fish which is an important aspect for fisheries management. In present study, the qualitative and quantitative analysis of gut content of Indian major carp rohu (*Labeo rohita* Ham. 1822) from Vallabhsagar reservoir (Gujarat), were conducted during June 2013 to May 2014. The results on gut content shows that qualitative changes in food component were not found but quantitative changes were observed during the study period. In the gut of fish, food contents i.e. phytoplankton (32.52 %), plant materials (25.07 %), Insects (13.39 %), decay matter (13.39 %) and zooplankton (11.42 %) were observed. The quantitative changes of food contents were also verified by the analysis of gasrosomatic index (GaSI) and it was maximum (5.582 ± 0.106) during post breeding season and minimum (3.589 ± 0.150) during breeding season as fish feeds voraciously to compensate the energy loss due to sexual maturity. On the basis of these results, it was concluded that studied fish (rohu) was herbivorous and mainly fed on phytoplankton and plant materials.

Keywords: Food and feeding, Gastrosomatic index, Gut analysis, Herbivorous, *Labeo rohita*

INTRODUCTION

Rohu (*Labeo rohita*) is one of the most preferred and rapid growing fish among the Indian major carps and it is accepted as a potential aquaculture species in different parts of the world including India, Pakistan, Bangladesh, Myanmar and other southern Asian countries. The magnitude of fish population in a region is the function of food potentialities and varies with the species, season, availability, food item preference, maturity stage and spawning season of the fish (Krishna *et al.*, 2016). Fish performs their various physiological activities such as growth, reproduction, restoration etc. with the help of energy obtained from the food and are highly adopted in their feeding habits with utilizing most of the readily available food components. The qualitative and quantitative dietary analysis of fish in their natural habitats enhances the understanding of the growth, abundance, productivity of water body (Nansimole *et al.*, 2014) and used to describe food habits, feeding patterns of fishes (Ekpo *et al.*, 2014). The feeding intensity of mature fish decreases during the spawning season, as compared to the non-spawning season (Ujjania, 2003). The relationship between the fish and food component is essential for the production and exploitation of the fish stocks (Panicker, 2000). The food and feeding habit of *Oreochromis mossambicus* (Peters) in relation to seasonal changes in a small pond of upper Assam is described

by Hatikakoty and Biswas (2003). Ujjania (2003) studied the gastrosomatic index of Indian Major Carp in three different water bodies of southern Rajasthan. Euphrasia (2004) reported the food and feeding habits of *Osteobrama bakeri* and Manoj kumar (2006) studied the feeding habits of *Puntius carnaticus* from Kerala. Padmakumar *et al.* (2009) elaborated the food and feeding behavior of golden catfish in water body of Gunther. Shalloof and Khalifa (2009) reported about stomach contents and feeding habit of *Oreochromis niloticus* from Abu-Zabal lakes, Egypt and Omondi *et al.* (2013) studied the food and feeding habit of three freshwater fishes of Baringo lake, Kenya. Information regarding food and feeding habit is basic criteria for its reproduction and farming management. Thus, the present study was conducted to gather the information on quality, quantity of food contents and feeding habit of rohu (*L. rohita*) in large reservoir with reference to seasonal variation and it would be helpful to prepare the management strategy and policies for sustainable management of reservoir fishery.

MATERIALS AND METHODS

Total 58 specimens of *Labeo rohita* were randomly collected during June 2013 to May 2014 from commercial landing centers (Serula, Ukai, Chacharbunda, Thuthi, Jamli and parchuli) of Vallabhsagar reservoir which is situated on river Tapi at 21° 15'N Latitude and 73° 35'E Longitude geographical location (Fig. 1).

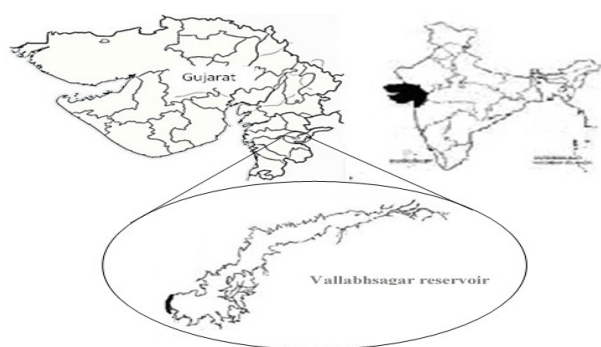


Fig. 1. Map of the study area (Vallabhsagar reservoir).

The fish can easily identify with conspicuously arched head silver body, cycloid scale and 12-13 dorsal fin rays (Day 1869). Each specimen was weighed to the nearest 1.0 gm with the help of top loading single pan balance (Sartorius 'PT' 600) and dissect the fish to collect gut. Weight of gut was measured and its contents were preserved in 4 % formalin solution and bring at Research laboratory, Department of Aquatic Biology, Veer Narmad South Gujarat University, Surat for further analysis. The gut contents were analyzed with the help of Trinocular microscope (Olympus CH 20i) to follow the frequency occurrence methods of Hynes (1950) and Pillay (1952) and grouped in zooplankton, phytoplankton, plant material, insects and decay matter.

Gastrosomatic Index (GaSI) for each month was obtained through the equation (1) of Desai (1970). For data compilation and calculation software PAST 1.021 was used.

$GaSI = \text{Weight of the gut} / \text{Total weight of the fish} \times 100$

Table 1. Gastrosomatic index of *Labeo rohita* in Vallabhsagar reservoir.

Seasons	Minimum	Maximum	Mean \pm SE
Monsoon	2.506	5.783	3.589 \pm 0.150
Post-Monsoon	4.063	7.385	5.582 \pm 0.106
Pre-Monsoon	2.781	7.195	4.569 \pm 0.429
Pooled	2.506	7.385	4.587 \pm 0.159

RESULTS AND DISCUSSION

The result of the study is elaborated in the table 1 and figure 2 (A, B, C and D). The results shows that dominance of gut contents, Phytoplankton (34 %) > Plant material (24 %) > Decay matter (15 %) > Insects (14 %) > Zooplankton (13 %) during monsoon, Phytoplankton (37 %) > Plant material (18 %) > Decay matter (16 %) > Insects (15 %) > Zooplankton (14 %) during post monsoon and Plant material (40 %) > Phytoplankton (29 %) > Insects (13 %) > Decay matter (10 %) > Zooplankton (8 %) during pre-monsoon season were observed whereas it was Phytoplankton (34 %) > Plant material (26 %) > Decay matter (14 %) > Insects (14 %) > Zooplankton (12 %) during the study period (Fig. 2, A, B, C and D). Results shows that qualitative changes in different season was not observed whereas gut contents were dominated by phytoplankton and plant materials which indicate that studied fish species is herbivores. It may be due to food preference and availability of different food contents in water body. Alikunhi (1952) reported *Labeo rohita* as plankton feeder from sub-tropical water bodies and Ravindrathan (2003) documented the major food content of the *L. rohita* specifying it as herbivorous fish. Kumar *et al.* (2007) assigned the *L. rohita* as plankton feeder.

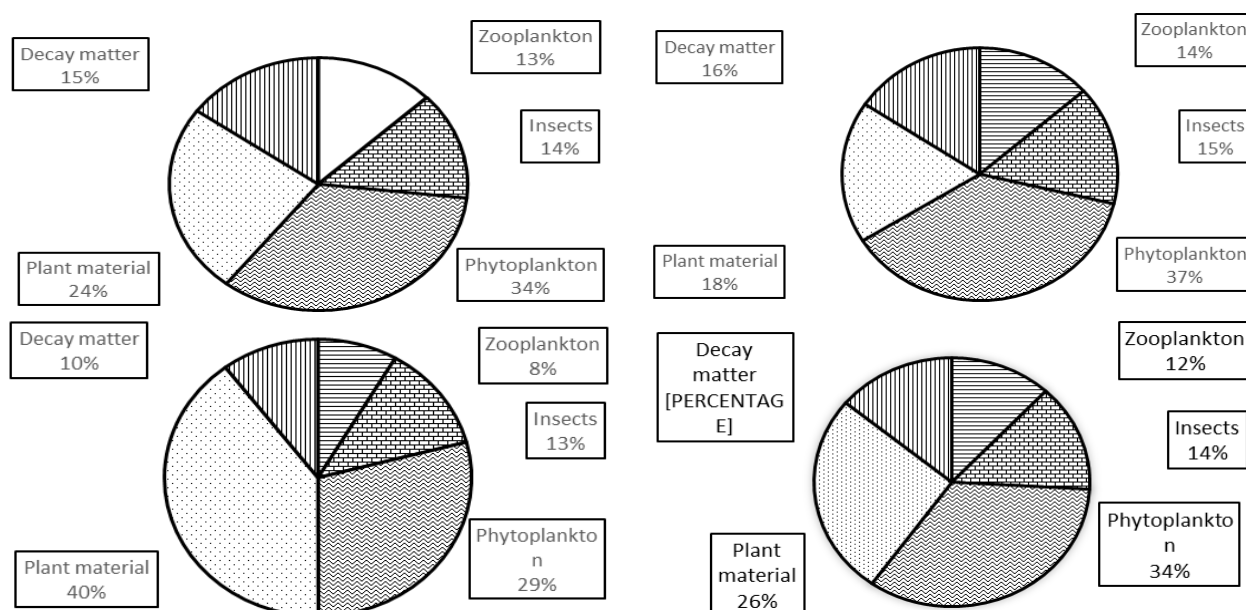


Fig. 2. Seasonal variations in gut contents of *Labeo rohita* in Vallabhsagar reservoir (A- Monsoon, B- Post monsoon, C- Pre monsoon and D- Pooled).

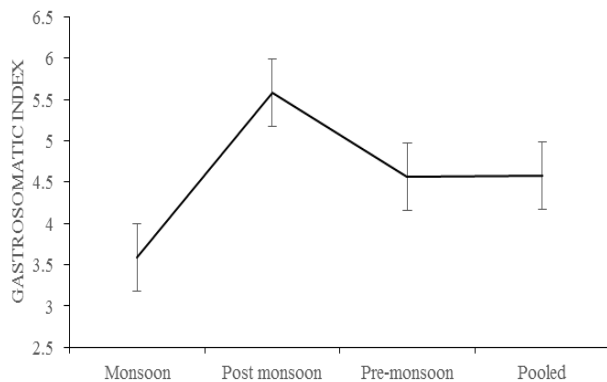


Fig. 3. Seasonal variation in gastroscopic index of *Labeo rohita* in Vallabhsagra reservoir.

Manon and Hossain (2011) studied the food and feeding habit of *Cyprinus carpio* from Nawgao Bangladesh and reported the studied fish as herbivores. Khabade (2015) and Maheshwari (2015) analyzed the gut contents of rohu from Siddhewadi lake of Sangli and Singanallur lake, Combatore, Tamil Nadu, respectively and reported that rohu is herbivorous fish. Similarly, Rajanna *et al.* (2015) also reported that *Labeo fimbriatus* from Vanivalas Sagar of Karnataka was herbivorous.

Quantitative variation in food contents during the study was observed and verified by the analysis of gastroscopic index. It was minimum (3.932 ± 0.2) during the breeding season and maximum (5.378 ± 0.2) during the post breeding season whereas annual mean of it was 4.537 ± 0.159 (Table 1 and Fig. 3). Result depict that during spawning season, feeding rate decreases and increases immediately after spawning as the fish feeds voraciously to compensate the energy loss during the breeding (monsoon season). Similar observation was documented by Rao *et al.* (1998) on channa species from East Godavari district (A.P.), Hatikakoty and Biswas (2003) on Tilapia from sub-tropical water body and by Kumar *et al.* (2015) on Catla from Udai Sagar Rajasthan. Similarly, Sarkar and Deepak (2009) studied the gastroscopic index value of *Chitala chitala* and reported it maximum during pre-monsoon and minimum during monsoon season.

Conclusion

The seasonal changes in quality of food contents was not observed but gut contents were dominated by phytoplankton and plant material which indicates that fish is herbivorous. Seasonal changes in quantity of gut content was observed and it is confirmed by the determination of gastroscopic index (GaSI). The value of GaSI was minimum during breeding season and maximum during post breeding which inferred that fishes utilize their energy for gonadal development and maximum value indicates availability of sufficient food and intensive feeding after breeding season.

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